Fishery Interim Progress Report Series No. 07-06

C Pond Smallmouth Bass Investigations

By David P. Boucher

Caring for Maine's Outdoor Future

December, 2007
Maine Department of Inland Fisheries and Wildlife
Division of Fisheries & Wildlife

FISHERY INTERIM PROGRESS REPORT SERIES NO. 07-06
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BY
DAVID P. BOUCHER

MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
DIVISION OF FISHERIES AND HATCHERIES
AUGUSTA, MAINE

DECEMBER 2007

JOB F-028
INTERIM PROGRESS REPORT NO. 2 (2007)
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SUMMARY

C Pond has a surface area of 173 acres and is located in C Surplus Township in north central Oxford County, Maine. The pond's outlet forms the Dead Cambridge River, which flows 7.8 miles to Umbagog Lake, the lowermost water body of the Rangeley Chain of Lakes. C Pond supports wild brook trout that provide an excellent early-season sport fishery.

Local anglers first reported the presence of smallmouth bass in C Pond in 2001. That same year, Department biologists conducted fish surveys but did not confirm the presence of bass. Additional reports of bass were received in 2002 and 2005. Trapnet and scuba surveys conducted in 2005 confirmed the presence of small numbers of adult and juvenile bass. Bass most likely migrated upstream from Umbagog Lake where they were illegally introduced during the mid-1980s. The presence of smallmouth bass could severely impact C Pond's wild brook trout population.

In 2006 we recommended the construction of a fish barrier on the Dead Cambridge River to prevent the continued upstream movement of bass and other species from Umbagog Lake, combined with an intensive effort to physically remove bass that had colonized C Pond. In 2007, construction of the fish barrier was completed, and we continued field trials to physically remove bass in C Pond through raft electrofishing. In addition, the Dead Cambridge River and its tributaries above the fish barrier were surveyed to determine the distribution of bass below C Pond.

Raft electrofishing proved to be an efficient means of removing large numbers of bass from C Pond over a two-year period. However, young-of-year and yearling bass remained abundant, indicating that some adult bass survived to spawn successfully despite intensive removal work. We concluded that complete eradication of smallmouth bass from C Pond using electrofishing techniques is not feasible, and that this effort should be abandoned.

Despite our failure to eradicate bass from C Pond, the project provided important information on the feasibility of such an effort in a large brook trout pond (173 acres) that bass have only recently colonized. Raft electrofishing could perhaps be used to successfully eradicate bass, or other invasive fishes, in very small ponds (<25-50 acres) with limited tributary systems. This idea should be explored if an opportunity arises, and if staffing and funding are available.

The feasibility of chemically reclaiming C Pond is currently being assessed. Complicating factors include the pond's relatively large size and the likely need to include the Dead Cambridge River and its tributaries downstream to the new fish barrier (2.8 miles). Regardless of the outcome of the chemical treatment, the fish barrier on the Dead Cambridge River will be beneficial because it will exclude other invasive fish species that may become established in Umbagog Lake in the future.

KEYWORDS: BKT, SMB, BARRIER, DAM, SAMPLING TECHNIQUE, RECLAMATION

INTRODUCTION AND STUDY AREA

C Pond is located in C Surplus TWP in Oxford County, Maine. The pond lies at an elevation of 1,292 feet, has a surface area of 173 acres, and mean and maximum depths of 10 and 36 feet, respectively. Three small unnamed tributaries enter C Pond, and four larger streams (Lost, Red, Mountain, and Greenwood Brooks) enter the outlet stream a short distance below the pond (Figure 1). C Pond's outlet forms the Dead Cambridge River, which flows 7.8 miles to Umbagog Lake, the lowermost water body of the Rangeley Chain of Lakes.

Public access is seasonally restricted by a gate located on the Mountain Brook Road crossing, about 1.5 mile from C Pond. This gate remains locked in the early spring until local roads become dry, and during a portion of the peregrine nesting season.

Much of C Pond remains homothermous during the summer months, but brook trout (*Salvelinus fontinalis*) nonetheless thrive and provide an excellent early-season sport fishery. Brook trout were stocked from 1958 to 1968, but the current population is sustained entirely by natural reproduction. Fishing regulations for brook trout include artificial lures only, a daily bag limit of 2 fish, and a minimum length limit of 10 inches; only one may exceed 12 inches. C Pond is closed to ice fishing.

C Pond also supports large populations of brown bullheads (*Ameiurus nebulosus*), white suckers (*Catastomus commersoni)*, pumpkinseed sunfish (*Lepomis gibbosus*), and a variety of cyprinid species. A list of fishes known to occur in C Pond is provided in Appendix 1.

Local anglers first reported the presence of smallmouth bass (*Micropterus dolomieu*) in C Pond in 2001. Trapnet and scuba surveys conducted in 2005 confirmed the presence of small numbers of adult and juvenile bass (Boucher 2006). Bass most likely migrated upstream from Umbagog Lake where they were illegally introduced during the mid-1980s (Boucher 2005). We hypothesize that beaver dams on the Dead Cambridge River delayed upstream movement of bass, or permitted only intermittent access of bass to C Pond, but an illegal introduction directly into C Pond cannot be ruled out.

Surveys conducted in 2005 suggested that smallmouth bass had not yet become well established in C Pond. Therefore, we recommended the construction of a fish barrier on the Dead Cambridge River, at the site of the old log-driving dam, combined with an intensive effort to physically remove bass that had become established in C Pond. Both projects were completed in 2007 and are the subjects of this report.

METHODS

Construction of a waterfall fish barrier by rock excavation was completed in October 2007, at the site of the old log-driving dam (Figure 1). Blasting and excavation removed about 800 cubic yards of material immediately downstream of the structure.

An electrofishing raft was employed to remove bass in 2007. Four removal events occurred on June 11-13, June 21, September 6, and September 17-18. Timing of this work coincided with bass spawning to enhance opportunities to capture mature male bass from guarded nests, and to maximize the likelihood of all bass cohorts being congregated in fishable shoal areas. Work was conducted primarily during daylight hours, except night surveys were made during the June 21 and September 6 events. Electrofishing effort focused on known bass spawning areas and nursery habitat, but shorelines exhibiting other habitat features were also fished. Total

electrofishing effort in 2007 was 7.34 hours. Smallmouth bass and brook trout were measured, weighed, and scales were obtained for age determination. All smallmouth bass were euthanized.

Scuba divers located active bass nests on June 11 and 12 and directed the electrofishing raft to these locations. Three male fish were removed from nests in this manner, and four others noted by the raft crew were removed from other locations.

Fish collections were made using backpack electrofishers in the Dead Cambridge River and its tributaries below C Pond and above the fish barrier. The objectives of this work were to determine the distribution of smallmouth bass and to evaluate the feasibility of chemical reclamation.

SUMMARY OF FINDINGS

- A vertical drop fish barrier, approximately 6.5 feet high, was created in solid bedrock and with rock gabions. The tailwater spillway, approximately 90 feet long, was cleared to bedrock of most material in order to avoid creation of a plunge pool below the vertical wall.

- For all electrofishing runs combined, smallmouth bass were captured at a rate of 20.0 fish/hour in 2007 (Table 1). Catch rates were highest in September and lowest in late June. Limited sampling in June and September suggested that nighttime electrofishing was more efficient than day sampling. The combined electrofishing catch rate in 2007 was nearly identical to that obtained in 2006 (23.2 fish/hour).

- As in 2006, there were considerable differences in bass age structure between the June and September 2007 captures (Table 2). The June samples were dominated by age I fish (brood year 2006), whereas the September catch was composed primarily of age 0+ fish (2007 brood year). Age II and III bass were captured in June 2007 as well, and the September samples contained several age I+ fish that escaped the June sampling.

- Data from 2006 (Boucher 2006) and 2007 show that we were unsuccessful in completely eradicating either the principal bass cohorts (ages 0-III) or older-age bass, despite two years of intensive removal efforts. These efforts include 2,013 hours of spring trapnetting, 18 hours of angling, and nearly 16 hours of electrofishing over 15 days.

- Growth of bass (Table 3) was rapid when compared to most Maine lakes (Jordan 2001). Excellent growth likely was a consequence of relatively low bass densities and abundant food resources.

- Smallmouth bass were not collected in the Dead Cambridge River between the pond and the fish barrier (Figure 2). Nor were bass collected in several tributaries to the river. Habitat for bass was classified as poor in both the river and tributary reaches that were sampled.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives have focused on preventing additional upstream migration of bass and attempting to completely remove bass already established in C Pond. In 2007, we completed construction of a physical barrier to the movement of bass and other species from Umbagog Lake, and continued efforts to physically remove bass in C Pond through raft electrofishing. In addition, the outlet and tributaries above the fish barrier were surveyed to determine the distribution of bass below C Pond.

Raft electrofishing proved to be an efficient means of removing large numbers of bass from C Pond over a two-year period. However, September samples from both years showed that young-of-year bass remained abundant, so some adult bass survived to spawn successfully despite the intensive removal work in June. We conclude that complete eradication of smallmouth bass from C Pond using the removal techniques we employed is not feasible, and we recommend that this effort be abandoned.

Despite our failure to eradicate bass from C Pond, the project provided important information on the feasibility of such an effort in a large brook trout pond that bass have only recently colonized. Raft electrofishing could perhaps be used to successfully eradicate bass, or other invasive fishes, in very small ponds (<25-50 acres) with limited tributary systems. This idea should be explored if an opportunity arises, and if staffing and funding are available.

The feasibility of chemically reclaiming C Pond is currently being assessed. Complicating factors include the pond's relatively large size and the likely need to include the Dead Cambridge River and its tributaries downstream to the new fish barrier (2.8 miles). Sampling in 2007 indicated that smallmouth bass have not colonized these areas, and bass habitat was rated as poor, but they should probably be included in the treatment area to maximize the likelihood of success.

Regardless of the outcome of the chemical treatment, the fish barrier constructed on the Dead Cambridge River will be beneficial because it will exclude other invasive fish species that may become established in Umbagog Lake in the future. For example, rock bass (*Ambloplites rupestris*) have recently colonized the Androscoggin River below Umbagog Lake, and anglers have reported northern pike (*Esox lucius*) from Umbagog Lake, though this remains unconfirmed.

ACKNOWLEDGMENTS

FPLE Hydro's Protection and Enhancement Fund, the Orvis Corporation, and a private donor provided funding to complete the barrier dam. Bob Stephens of Stephens Associates Consulting Engineers provided many hours of volunteer time to provide technical oversight during construction of the barrier. Special thanks are extended to the primary contractor for the barrier project, Joe Haley and his staff from M&H Logging. C Pond campowners Bill Kelley, George Baker, and Rick Mills assisted us in all phases of the project.

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Prepared by:
David P. Boucher
December 2007

Figure 1. Location map for C Pond and tributaries.

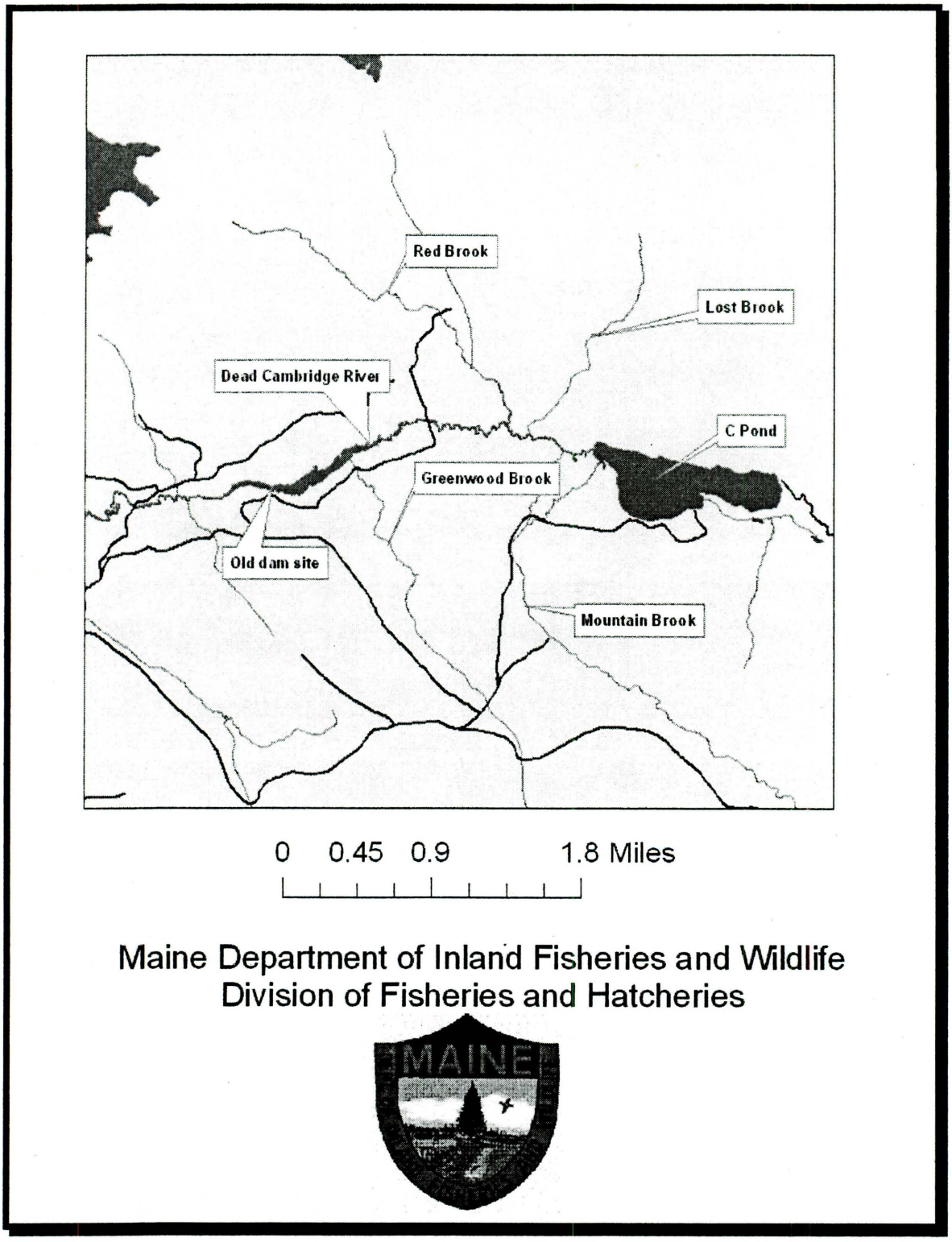


Table 1. Electrofishing effort and catch results for smallmouth bass and brook trout in C Pond, 2006-2007 (all runs combined for each date).

Date	DAY/NIGHT?	Effort (hours)	No. SMB[1] caught	No. SMB caught per hour	No. BKT[2] caught	No. BKT caught per hour
June 12, 2006	Day	1.89	13	6.9	7	3.7
June 13, 2006	Day	2.26	51	22.6	4	1.8
June 22, 2006	Day	1.43	14	9.8	0	0
June 23, 2006	Day	0.65	4	6.2	0	0
September 19, 2006	Day	1.49	71	47.7	8	5.4
September 20, 2006	Day	0.90	47	52.2	0	0
June 11, 2007	Day	0.71	9	12.7	4	5.6
June 12. 2007	Day	1.03	23	22.3	0	0
June 13, 2007	Day	0.98	3	3.1	3	3.1
June 21, 2007	Day	1.41	0	0	3	2.1
June 21, 2007	Night	0.55	6	10.9	2	3.6
September 6, 2007	Day	0.94	13	13.8	4	4.3
September 6, 2007	Night	0.74	22	29.7	9	12.2
September 17, 2007	Day	0.63	57	90.3	4	6.3
September 18, 2007	Day	0.35	14	40.5	0	0
Totals June 2006		**6.23**	**82**	**13.2**	**11**	**1.8**
Totals June 2007		**4.68**	**41**	**8.8**	**12**	**2.6**
Totals September 2006		**2.39**	**118**	**49.4**	**8**	**3.4**
Totals September 2007		**2.66**	**106**	**39.9**	**17**	**6.4**
Totals, 2006		**8.62**	**200**	**23.2**	**19**	**2.2**
Totals, 2007		**7.34**	**147**	**20.0**	**29**	**4.0**

[1] SMB = Smallmouth bass
[2] BKT = Brook trout

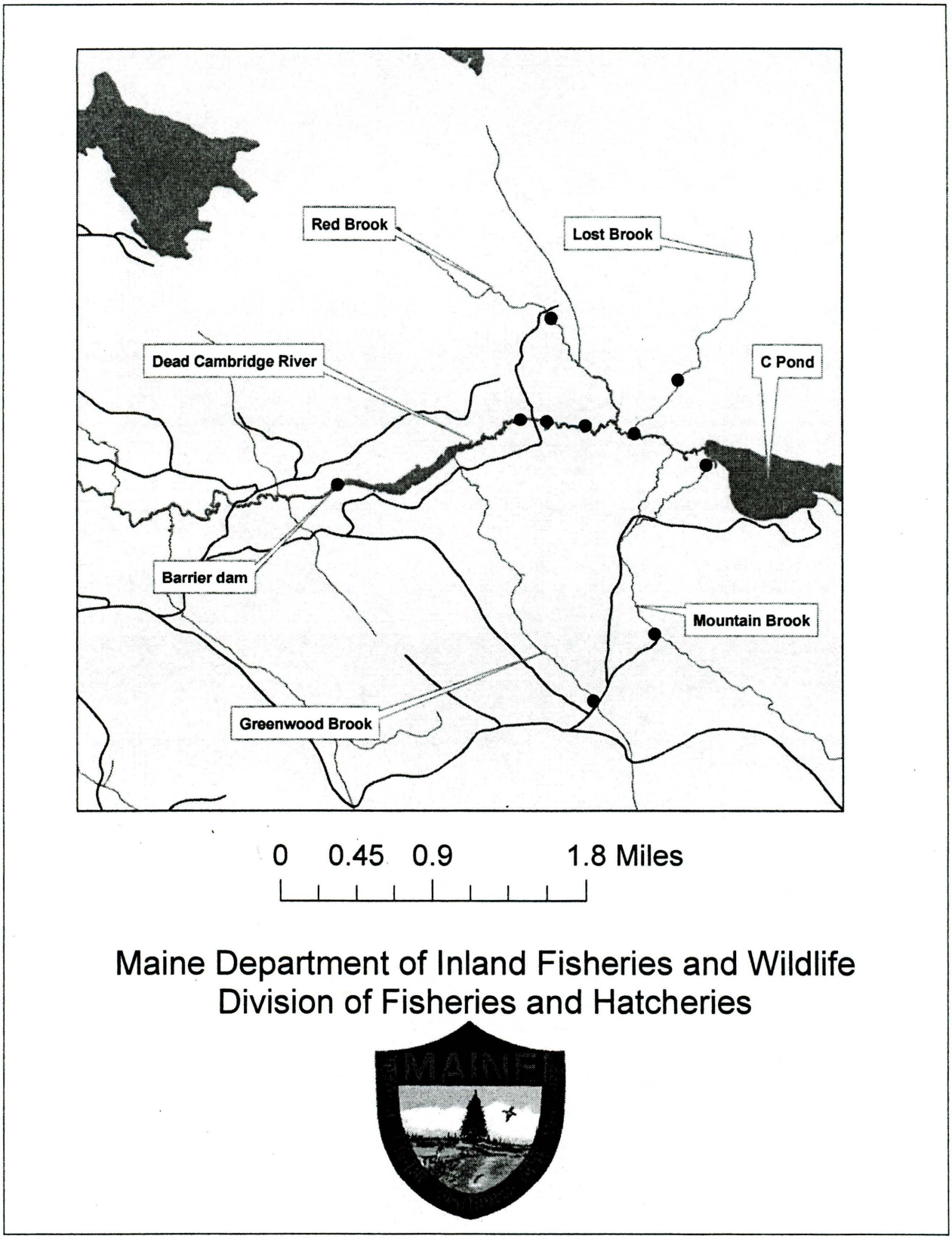
Table 2. Age structure of smallmouth bass removed from C Pond, 2006 and 2007.

Age	Number captured (%) at age during: June 2006	June 2007	Age	September 2006	September 2007
0+	*	*	0+	106 (89.8)	99 (95.2)
I	118 (92.2)	24 (60.0)	I	*	*
I+	*	*	I+	12 (10.2)	4 (3.9)
II	6 (4.7)	14 (35.0)	II	*	*
II+	*	*	II+	0	0
III	0	2 (5.0)	III	*	*
III+	*	*	III+	0	0
IV	0	0	IV	*	*
IV+	*	*	IV+	0	0
V	3 (2.3)	0	V	*	*
V+	*	*	V+	0	0
VI	1 (0.8)	0	VI	*	*
VI+	*	*	VI+	0	1 (0.9)

Table 3. Length at age of smallmouth bass removed from C Pond, 2007.

Age	No. fish	Mean length (in)±SE	Range in length (in)
0+	99	3.0±0.05	1.9-3.7
I	24	3.7±0.09	2.9-4.6
I+	4	6.9±0.19	6.4-7.3
II	14	8.1±0.22	6.5-9.0
III	2	11.6±1.0	10.6-12.6
VI+	1	16.7±0	*

Figure 2. Location of fish collection and habitat assessment surveys, Dead Cambridge River and tributaries, 2007. Black dots denote sample sites.



Appendix 1. Fish species known to occur in C Pond, C Surplus TWP, Maine.

Species
Brook trout (*Salvelinus fontinalis*)
Rainbow smelt (*Osmerus mordax*)
Brown bullhead (*Ameiurus nebulosus*)
Pumpkinseed sunfish (*Lepomis gibbosus*)
Smallmouth bass (*Micropterus dolomieu*)
Fallfish (*Semotilus corporalis*)
Lake chub (*Couesius plumbeus*)
Creek chub (*Semotilus atromaculatus*)
Blacknose shiner (*Notropis heterolepis*)
Common shiner (*Luxilus cornutus*)
Golden shiner (*Notemigonus crysoleucas*)
Fathead minnow (*Pimephales promelas*)
White sucker (*Catastomus commersoni*)
Slimy sculpin (*Cottus cognatus*)

COOPERATIVE

STATE FEDERAL

PROJECT

This report has been funded in part by the Federal Aid in Sport Fish Restoration Program. This is a cooperative effort involving federal and state government agencies. The program is designed to increase sport fishing and boating opportunities through the wise investment of anglers' and boaters' tax dollars in state sport fishery projects. This program which was funded in 1950 was named the Dingell-Johnson Act in recognition of the congressmen who spearheaded this effort. In 1984 this act was amended through the Wallop-Breaux Amendment (also named for the congressional sponsors) and provided a threefold increase in Federal monies for sportfish restoration, aquatic education and motorboat access.

The Program is an outstanding example of a "user pays-user benefits", or "user fee" program. In this case, anglers and boaters are the users. Briefly, anglers and boaters are responsible for payment of fishing tackle excise taxes, motorboat fuel taxes, and import duties on tackle and boats. These monies are collected by the sport fishing industry, deposited in the Department of Treasury, and are allocated the year following collection to state fishery agencies for sport fisheries and boating access projects. Generally, each project must be evaluated and approved by the U.S. Fish and Wildlife Service (USFWS). The benefits provided by these projects to users complete the cycle between "user pays — user benefits".

Maine Department of Inland Fisheries and Wildlife
284 State Street, Station #41, Augusta, ME 04333